

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-221567

(43)Date of publication of application : 26.08.1997

(51)Int.Cl.

C08L 23/00
C08K 13/02
C08K 13/02
//(C08K 13/02
C08K 3:32
C08K 5:16
C08K 5:053)

(21)Application number : 08-050892

(71)Applicant : CHISSO CORP

(22)Date of filing : 13.02.1996

(72)Inventor : NARITA KENSHO

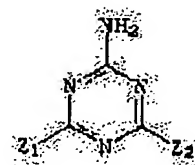
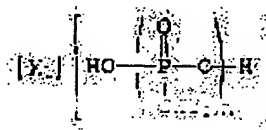
TAKEBAYASHI TAKASHI

(54) FLAME-RETARDANT POLYOLEFIN RESIN COMPOSITION

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a polyolefin resin composition which shows excellent flame retardancy even when it contains only a small amount of a flame retardant by mixing a polyolefin resin with a polyammonium phosphate compound, a novel phosphate, a nitrogenous compound, etc.

SOLUTION: This composition is prepared by mixing a polyolefin resin with 1-30wt.% polyammonium phosphate compound (A) with 0.1-30wt.% (condensed) amine phosphate (B) represented by formula I [wherein n is 1-100; X1 is R1R2N (CH2)nNR3R4, piperazine, a diamine containing a piperazine ring; R1 to R4 are each H or a 1-5C alkyl; m is 1-10; Y1 is NH3 or a triazine derivative represented by formula II; Z1 and Z2 are each -NR5R6, hydroxyl, mercapto, a 1-10C alkyl, a 1-10C alkoxy, a phenyl or vinyl; and R5 and R6 are each a 1-6C alkyl or methylol], 0.1-30wt.% nitrogenous compound (C) and 0.1-20wt.% polyhydric alcohol (D). The total amount of components A, B, C and/or D should be 10-50wt.% based on the entire composition.



* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

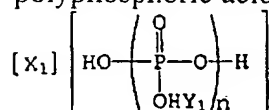
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

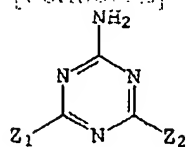
[Claim 1] The fire-resistant polyolefine system resin constituent characterized by blending the following component (A), (B), (C), and/or (D) with polyolefine system resin.

(A) the phosphoric-acid amine salt or condensed-phosphoric-acid amine ** expressed with a polyphosphoric acid ammonium compound and (B) following-ization 1 -- [Formula 1]



(n is the integer of 1-100 among a formula, X1 is the diamine containing [R1R2-N(CH2) mNR three R4], a piperazine, or a piperazine ring, R1, R2, R3, and R4 are the straight chain of H or carbon numbers 1-5, or the alkyl group of branching, respectively, and even if R1, R2, R3, and R4 are the same radicals, they may differ.) m is the integer of 1-10, and Y1 is a triazine derivative expressed with three NH(s) or the following-ization 2 in ** 1.

[Formula 2]



(a formula -- inside -- Z -- one -- and -- Z -- two -- being the same -- even when -- differing -- **** - NR -- five -- R -- six -- a set -- [-- here -- R -- five -- R -- six -- the same -- or -- having differed -- H -- or -- a carbon number -- one - six -- a straight chain -- or -- branching -- an alkyl group -- or -- the methylol -- a radical --] -- a hydroxyl group -- a sulfhydryl group -- a carbon number -- one - ten -- a straight chain -- or -- branching -- an alkyl group -- a carbon number -- one - ten -- a straight chain -- or -- branching -- an alkoxy group -- a phenyl group -- and -- a vinyl group -- from -- becoming -- a group -- choosing -- having -- a radical -- it is .

(C) A nitrogen-containing organic compound, (D) polyhydric alcohol.

[Claim 2] The fire-resistant polyolefine system resin constituent which makes the whole constituent 100 % of the weight, and is characterized by blending the following component (A), (B), (C), and/or (D) with polyolefine system resin ten to 50% of the weight in total.

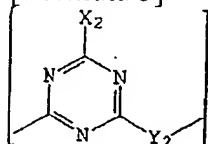
(A) It is [Claim 3] 1 - 30 % of the weight of polyphosphoric acid ammonium compounds, the phosphoric-acid amine salt expressed with ** 1 according to claim 1 or 0.1 - 30 % of the weight of condensed-phosphoric-acid amine salts and the (B) (C) nitrogen-containing compound 0.1 - 0.1 - 20 % of the weight of 30-% of the weight (D) polyhydric alcohol. The fire-resistant polyolefine system resin constituent of claim 1 whose oxygen index is 30 or more, or claim 2 given in any 1 term.

[Claim 4] The fire-resistant polyolefine system resin constituent of claim 1-3 which is the compound with which a polyphosphoric acid ammonium compound uses as a principal component the ammonium

polyphosphate or ammonium polyphosphate expressed with general formula $(\text{NH}_4)^{r+2} \text{PrO}_3^{r+1}$ (however, r integer of 20-1000) given in any 1 term.

[Claim 5] The fire-resistant polyolefine system resin constituent of claim 1-4 which is the homopolymer and/or copolymer with which a nitrogen-containing organic compound consists of a configuration unit expressed with the following-ization 3 given in any 1 term.

[Formula 3]



X₂ and Y₂ are radicals which each has combined with the triazine frame through a nitrogen atom among [type. The ARUKINO amino group as which X₂ is expressed in -NHR₇ or -NR₈ eight R₉, It is a morpholino radical or a piperidino radical, and each of R₇, R₈, and R₉ is the lines or branching-like alkyl groups containing 1-6 carbon atoms (R₈ and R₉ may be the same or a different radical mutually). X₂ is a hydroxy ARUKINO amino group expressed with -NHR₁₀ or -NR₁₁R₁₂. Each of R₁₀, R₁₁, and R₁₂ is the lines or branching-like hydroxyalkyl radicals containing 2-6 carbon atoms (the same or a different radical is mutually sufficient as R₁₁ and R₁₂). Y₂ is the divalent radical of a piperazine, and a divalent radical (it is here) expressed with formula-HN(CH₂)_sNH-. or s is the number of 2-6, it is a divalent radical (t is the integer of 2-4 here) expressed with -NR₁₃(CH₂)_tR₁₄N-, and either [at least] R₁₃ or R₁₄ are a hydroxyethyl radical --] .

[Claim 6] The fire-resistant polyolefine system resin constituent of claim 1-4 whose nitrogen-containing organic compound is a product obtained by the reaction of cyanuric acid chloride and diamines given in any 1 term.

[Claim 7] The fire-resistant polyolefine system resin constituent of claim 1-4 whose nitrogen-containing compound is one or more sorts chosen from the group which consists of the resultant of a melamine, MEREMU, MERAMU, AMMERIN, a phosphoric-acid melamine, a polyphosphoric acid melamine, a cyanuric acid melamine, tris (2-hydroxyethyl) isocyanurate, an ethylene urea, and formaldehyde, the resultant of ethylenetiourea and formaldehyde, a resultant of an ethylene urea, a melamine, and formaldehyde, and a resultant of ethylenetiourea, a melamine, and formaldehyde given in any 1 term.

[Claim 8] The fire-resistant polyolefine system resin constituent of claim 1-4 which is one or more sorts chosen from the group which polyhydric alcohol becomes from the metal complex of pentaerythritol, dipentaerythritol, the poly pentaerythritol, neopentyl glycol, trimethylol propane, a mannitol, sorbitols, and those boric acid given in any 1 term.

[Claim 9] The fire-resistant polyolefine system resin constituent according to claim 4 characterized by being the compound by which covering or microencapsulation processing was carried out by one or more sorts of resin chosen from the thermosetting resin group which the compound which uses ammonium polyphosphate as a principal component becomes from a melamine monomer or melamine resin, denaturation melamine resin, guanamine resin, an epoxy resin, phenol resin, urethane resin, a urea-resin, and the poly carbodiimide on the surface of ammonium polyphosphate.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the fire-resistant polyolefine system resin constituent excellent in fire retardancy. It is related with the fire-resistant polyolefine system resin constituent excellent in the fire retardancy which consists of amounts of specification of the compound which uses ammonium polyphosphate as a principal component, the amine salt of a new phosphoric acid or a condensed-phosphoric-acid amine salt, a nitrogen-containing compound and/or polyhydric alcohol, and polyolefine system resin in more detail.

[0002] Conventionally, polyolefine system resin is used abundantly at various kinds of fields, such as buildings including the field of industrial use and a home electrical-and-electric-equipment product, a upholstery, and autoparts, taking advantage of predominance, such as the health nature, workability, chemical resistance, weatherability, electrical characteristics, and a mechanical strength, and the application for which polyolefine system resin is used is also expanded. With expansion of this application, fire retardancy begins to be required also of polyolefine system resin, and, moreover, the military requirement is becoming severe every year. Recently, it is independent, or the halogen content compound which is the mainstream of the especially conventional flameproofing technique is made into a flame retarder combining antimony compounds, such as antimony oxide, and it is regarded as questionable that the flame-retardant-resin constituent which blended it with polyolefine system resin generates halogen system gas at the time of combustion or shaping etc. Then, the flame-retardant-resin constituent which does not generate these halogen system gas at the time of combustion or shaping is beginning to be required.

[0003] In order to meet these demands, the approach of blending the specific metal hydrate which starts decomposition and dehydration by endothermic reaction in the combustion temperature of resin, and can control combustion of resin as an inorganic flame retarder is proposed recently. However, by this approach, since the fire-resistant grant effectiveness of the metal hydrate to be used is very weak, to blend so much is required, consequently the flame-retardant-resin constituent obtained has troubles, such as a fall of many properties, such as a fall of fabrication nature, and a fall of the mechanical strength of the mold goods obtained from this constituent.

[0004] In order to meet the above-mentioned demand, the technique using a specific phosphorus compound is proposed. For example, the charge of fire-prevention material which combined ethylenediamine phosphate, a melamine, and/or the salt of a cyanuric acid derivative, for example, a phosphoric-acid melamine etc., is proposed by JP,59-47285,A. Moreover, the fire-resistant thermoplastics constituent which blended the phosphate like phosphoric-acid alkyl diamine with the Patent Publication Heisei No. 508187 [five to] official report as a flame retarder is indicated. However, since ethylenediamine phosphate or phosphoric-acid alkyl diamine given [this] in an official report has high water solubility, the water resisting property of the resin constituent which comes to use this charge of fire-prevention material or this flame retarder falls, and it has the trouble that it cannot be used for an application which contacts moisture.

[0005] Moreover, the technique of applying new phosphite and new it to JP,63-277651,A as a fire prevention agent is indicated, and the process of a condensed-phosphoric-acid amino triazine compound useful for the flame-retarder application which gives fire retardancy to extensive resin and an extensive cellulosic material is indicated by JP,6-8308,B. However, since the component which has a foaming operation in this compound component is not contained, if it does not use together with a component with foaming operations, such as polyhydric alcohol, there is a trouble that advanced fire retardancy cannot be acquired in new phosphite and the new condensed-phosphoric-acid amino triazine compound which were obtained by the approach of an indication in this official report.

[0006] On the other hand, the manufacture approach of the amine salt of the new phosphoric acid used as a flameproofing additive of a certain kind of polymer constituent and the amine salt of a phosphoric acid is indicated by JP,4-22916,B and JP,4-21679,B as an approach of making a foaming component containing in a compound. However, in order to obtain the amine salt of the phosphoric acid of this official report indication, there is a problem that it cannot be said that it is advantageous to being unable to manufacture if it is necessary to use toxic phosphorus oxychloride as starting material and and does not pass through a complicated process, but producing in large quantities industrially.

[0007] Moreover, in the latest research, the self-extinguishing polymer constituent blended with thermoplastics by making the salt of a specific triazine derivative and the oxygenation acid of Lynn into a flame retarder is indicated in JP,6-87974,A and JP,6-340770,A. However, a compound given [these / this] in an official report also has ***** manufactured through a complicated process, and has the trouble that an addition must be made [many] for giving sufficient fire retardancy moreover.

[0008]

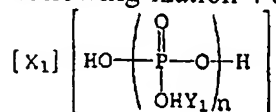
[Problem(s) to be Solved by the Invention] Then, this invention persons inquired wholeheartedly so that they may get the fire-resistant polyolefine system resin constituent which demonstrates high fire retardancy also with the loadings of few flame retarders. Consequently, by blending with polyolefine system resin the compound which uses ammonium polyphosphate as a principal component, new phosphate or a condensed phosphate, a nitrogen-containing compound, and/or the amount of specification of polyhydric alcohol, it found out that an above-mentioned technical problem was solvable, and this invention was completed based on this knowledge. The purpose of this invention is offering the polyolefine system resin which has the fire retardancy excellent in the addition with few flame retarders so that clearly from the above description.

[0009]

[Means for Solving the Problem] This invention has the following configuration.

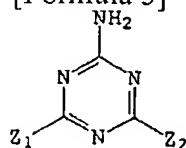
(1) The fire-resistant polyolefine system resin constituent characterized by blending the following component (A), (B), (C), and/or (D) with polyolefine system resin.

(A) A polyphosphoric acid ammonium compound, the phosphoric-acid amine salt expressed with (B) following-ization 4 or a condensed-phosphoric-acid amine salt, [Formula 4]



(n is the integer of 1-100 among a formula, X1 is the diamine containing [R1R2-N(CH2) mNR three R4], a piperazine, or a piperazine ring, R1, R2, R3, and R4 are the straight chain of H or carbon numbers 1-5, or the alkyl group of branching, respectively, and even if R1, R2, R3, and R4 are the same radicals, they may differ.) m is the integer of 1-10, and Y1 is a triazine derivative expressed with three NH(s) or the following-ization 5 in ** 4.

[Formula 5]



(a formula -- inside -- Z -- one -- and -- Z -- two -- being the same -- even when -- differing -- **** - NR -- five -- R -- six -- a set -- [-- here -- R -- five -- R -- six -- the same -- or -- having differed -- H -- or -- a carbon number -- one - six -- a straight chain -- or -- branching -- an alkyl group -- or -- the methylol -- a radical --] -- a hydroxyl group -- a sulfhydryl group -- a carbon number -- one - ten -- a straight chain -- or -- branching -- an alkyl group -- a carbon number -- one - ten -- a straight chain -- or -- branching -- an alkoxyl group -- a phenyl group -- and -- a vinyl group -- from -- becoming -- a group -- choosing -- having -- a radical -- it is .

(C) A nitrogen-containing organic compound, (D) polyhydric alcohol.

[0010] (2) The fire-resistant polyolefine system resin constituent which makes the whole constituent 100 % of the weight, and is characterized by blending the following component (A), (B), (C), and/or (D) with polyolefine system resin ten to 50% of the weight in total.

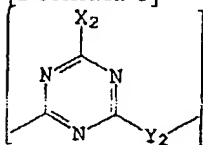
(A) 1 - 30 % of the weight of polyphosphoric acid ammonium compounds, the phosphoric-acid amine salt expressed with ** 4 given in the 1st term of (B) above or the condensed-phosphoric-acid amine salt 0.1 the 30-% of the weight and (C) nitrogen-containing compound 0.1 - 1 - 20 % of the weight of 30-% of the weight and (D) polyhydric alcohol.

(3) Said 1st term whose oxygen index is 30 or more, or a fire-resistant polyolefine system resin constituent given in the 2nd term.

(4) The fire-resistant polyolefine system resin constituent of said 1st term which is the compound with which a polyphosphoric acid ammonium compound uses as a principal component the ammonium polyphosphate or ammonium polyphosphate expressed with general formula $(\text{NH}_4)_{r+2}\text{P}_r\text{O}_{3r+1}$ (however, r integer of 20-1000) - the 3rd term given in any 1 term.

(5) The fire-resistant polyolefine system resin constituent of said 1st term which is the homopolymer and/or copolymer with which a nitrogen-containing organic compound consists of a configuration unit expressed with the following-ization 6 - the 4th term given in any 1 term.

[Formula 6]



X₂ and Y₂ are radicals which each has combined with the triazine frame through a nitrogen atom among [type. The ARUKINO amino group as which X₂ is expressed in -NHR₇ or -NR₈R₉. It is a morpholino radical or a piperidino radical, and each of R₇, R₈, and R₉ is the lines or branching-like alkyl groups containing 1-6 carbon atoms (R₈ and R₉ may be the same or a different radical mutually). X₂ is a hydroxy ARUKINO amino group expressed with -NHR₁₀ or -NR₁₁R₁₂. Each of R₁₀, R₁₁, and R₁₂ is the lines or branching-like hydroxyalkyl radicals containing 2-6 carbon atoms (the same or a different radical is mutually sufficient as R₁₁ and R₁₂). Y₂ is the divalent radical of a piperazine, and a divalent radical (it is here) expressed with formula-HN(CH₂)_sNH-. or s is the number of 2-6, it is a divalent radical (t is the integer of 2-4 here) expressed with -NR₁₃(CH₂)_tR₁₄N-, and either [at least] R₁₃ or R₁₄ are a hydroxyethyl radical --] .

[0011] (6) The fire-resistant polyolefine system resin constituent of said 1st term whose nitrogen-containing organic compound is a product obtained by the reaction of cyanuric acid chloride and diamines - the 4th term given in any 1 term.

(7) The fire-resistant polyolefine system resin constituent of said 1st term whose nitrogen-containing compound is one or more sorts chosen from the group which consists of the resultant of a melamine, MEREMU, MERAMU, AMMERIN, a phosphoric-acid melamine, a polyphosphoric acid melamine, a cyanuric acid melamine, tris (2-hydroxyethyl) isocyanurate, an ethylene urea, and formaldehyde, the resultant of ethylenetiourea and formaldehyde, a resultant of an ethylene urea, a melamine, and formaldehyde, and a resultant of ethylenetiourea, a melamine, and formaldehyde - the 4th term given in any 1 term.

[0012] (8) The fire-resistant polyolefine system resin constituent of said 1st term which is one or more

sorts chosen from the group which polyhydric alcohol becomes from the metal complex of pentaerythritol, dipentaerythritol, the poly pentaerythritol, neopentyl glycol, trimethylol propane, a mannitol, sorbitols, and those boric acid - the 4th term given in any 1 term.

(9) The fire-resistant polyolefine system resin constituent given [said] in the 4th term characterized by being the compound by which covering or microencapsulation processing was carried out by one or more sorts of resin chosen from the thermosetting resin group which the compound which uses ammonium polyphosphate as a principal component becomes from a melamine monomer or melamine resin, denaturation melamine resin, guanamine resin, an epoxy resin, phenol resin, urethane resin, a urea-resin, and the poly carbodiimide on the surface of ammonium polyphosphate.

[0013] The polyphosphoric acid ammonium compound which is one of the constituents of the fire-resistant polyolefine system resin constituent in connection with this invention is a compound which uses an ammonium polyphosphate simple substance or this ammonium polyphosphate as a principal component. This ammonium polyphosphate is the compound which can express with general formula $(\text{NH}_4)_r\text{P}_2\text{O}_7$ (however, r integer of 20-1000), and r is the compound which can be approximated to the formula $(\text{NH}_4\text{PO}_3)_r$ (r is the same as the above here) r of a metaphosphoric acid, when large enough. as the commercial item of this ammonium polyphosphate -- exoRITTO (Exolit) -422 (a trade name --) the Hoechst A.G. make and exoRITTO (Exolit) -700 (a trade name --) FOSUCHIEKU (Phos-chek)-P [the Hoechst A.G. make and]/30 (a trade name --) FOSUCHIEKU (Phos-chek)-P [the Monsanto Co. make and]/40 (a trade name --) The Monsanto Co. make, Sumisafe - P (a trade name, Sumitomo Chemical Co., Ltd. make), TERRAJU (TERRAJU) - S10 (a trademark, Chisso Corp. make), TERRAJU (TERRAJU) - S20 (a trademark, Chisso Corp. make) can be mentioned.

[0014] Moreover, since this ammonium polyphosphate simple substance tends to receive hydrolysis, what covered this ammonium polyphosphate particle with that which covered or microencapsulated this ammonium polyphosphate with thermosetting resin, a melamine monomer, other nitrogen-containing organic compounds, etc. can use it suitably, and also in what processed with the surfactant or the silicon compound, and the process in which ammonium polyphosphate is manufactured, it adds a melamine etc. and can use what was made refractory. for example, independent [as resin to cover / in resin such as an epoxy resin, urethane resin, acrylic resin, phenol resin, an alkyd resin, a urea-resin, and melamine resin,] as an approach of obtaining the ammonium polyphosphate which microencapsulated with thermosetting resin -- or it uses together, and it can encapsulate by well-known approaches, such as interfacial polymerization, an in-situ polymerization method, the hardening-in liquid method, a phase separation method, liquid drying, a fusion distribution cooling method, a spray drying process, and a powder floor method, and can obtain. thus, as a commercial item of the compound which uses as a principal component the ammonium polyphosphate which reduced hydrolysis nature ExoRITTO -462 (a trade name, Hoechst A.G. make) (Exolit), Sumisafe-PM (a trade name, Sumitomo Chemical Co., Ltd. make) and TERRAJU (TERRAJU)-C60 (a trademark --) The Chisso Corp. make, TERRAJU (TERRAJU) - M30 (a trademark, Chisso Corp. make), TERRAJU (TERRAJU) - C70 (a trademark, Chisso Corp. make), TERRAJU (TERRAJU) - C80 (a trademark, Chisso Corp. make) etc. is mentioned.

[0015] As loadings of the polyphosphoric acid ammonium compound for obtaining the flame-retardant-resin constituent of this invention, it is 10 - 20 % of the weight especially preferably five to 25% of the weight more preferably one to 30% of the weight to a constituent.

[0016] The phosphoric-acid amine salt or condensed-phosphoric-acid amine salt in connection with this invention which is one of the constituents of a fire-resistant polyolefine system resin constituent is a new compound, for example, can be obtained by the following approach. The phosphoric acid, or the degree about two to 100 condensed phosphoric acid of condensation of the specified quantity is put into a reaction container, without adding addition or a solvent for an inactive solvent. Namely, subsequently the diamine (R1, R2, R3, and R4 are the straight chain of H or carbon numbers 1-5, or the alkyl group of branching here, respectively -- even if R1, R2, R3, and R4 are the same radicals, they may differ.) expressed with $[\text{R}_1\text{R}_2\text{-N}(\text{CH}_2)_m\text{NR}_3\text{R}_4]$ Moreover, m dilutes and adds in direct or water with the dissolution or a solvent, and makes the compound (these are named generically below and it is called

diamines) which is the diamine containing the piperazine or piperazine **** which is the integer of 1-10 react to it at -10-100 degrees C. A reaction is neutralization and advances promptly. Next, the new (condensation) phosphoric-acid amine salt of this invention is obtained by making it add, heat and react, without diluting the triazine derivative expressed with ammonia or the above-ization 5 with solvents, such as water, or diluting, without isolating the reactant generated here or isolating.

[0017] The amount of the diamines which participate in a reaction, ammonia, and a triazine derivative changes with the Lynn concentration of the phosphoric acid to be used or condensed phosphoric acid. namely, a mol with few amounts of the diamines to add than a number of a hydroxyl group of 1/2 contained in a phosphoric acid or condensed phosphoric acid -- a number, preferably, an equimolecular amount is mostly added with a phosphoric acid or condensed phosphoric acid, it is made to react and an intermediate product is acquired. Subsequently, it adds and the ammonia or the triazine derivative of an amount equivalent to the hydroxyl group which remains to this intermediate product is made to react.

[0018] As a concrete example of these diamines, N, N, N', N'-tetramethyl diamino methane, - dimethyl ethylenediamine, and N'N, N'-diethyl ethylenediamine, [ethylenediamine, N, and] N and N-dimethyl ethylenediamine, N, and N-diethyl ethylenediamine, N, N, N', N'- tetramethylethylenediamine, N and N, N', N'-diethyl ethylenediamine, A tetramethylenediamine, 1,2-propanediamine, 1,3-propanediamine, A tetramethylenediamine, pentamethylene diamine, a hexamethylenediamine, 1, 7-diamino heptane, 1, 8-diamino octane, 1, 9-diamino nonane, 1, 10-diamino decane, piperazine, trans-2, 5-dimethyl piperazine, 1, 4-screw (2-aminoethyl) piperazine, 1, and 4-screw (3-aminopropyl) piperazine etc. is mentioned, and a commercial item can be used altogether.

[0019] moreover, as a concrete example of this triazine derivative A melamine, acetoguanamine, benzoguanamine, acrylic guanamine, 2, 4-diamino-6-nonyl-1,3,5-triazine, 2, 4-diamino-6-hide ROKISHI-1,3,5-triazine, The 2-amino -4, 6-JIHAIOROKISHI-1,3,5-triazine, 2, 4-diamino-6-methoxy-1,3,5-triazine, 2, 4-diamino-6-ethoxy-1,3,5-triazine, 2, 4-diamino-6-propoxy-1,3,5-triazine, 2, 4-diamino-6-isopropoxy-1,3,5-triazine, 2, 4-diamino-6-mercapto-1,3,5-triazine, the 2-amino -4, 6-dimercapto-1,3,5-triazine, etc. are mentioned, and a commercial item can be used altogether.

[0020] As loadings of the amine salt of the new phosphoric acid for obtaining the flame-retardant-resin constituent of this invention, or the amine salt of condensed phosphoric acid, it is 1 - 10 % of the weight especially preferably 0.5 to 20% of the weight more preferably 0.1 to 30% of the weight to a constituent.

[0021] When it exists in polyolefine system resin with other components in connection with this invention, while the nitrogen-containing organic compound which is one of the constituents of the fire-resistant polyolefine system resin constituent in connection with this invention generates nonflammable gas with the heat by contact of ignition, ignition, or flame etc., it is a compound which promotes generation or generation of this carbonaceous residue, and carbonaceous residue is specifically illustrated by following the (1) - (3).

[0022] It is the homopolymer and/or copolymer which make a base unit monomer structure expressed with the above-ization 6. (1) As an example of the radical of X2 in a formula A monomethylamino radical, a dimethylamino radical, a methylethylamino radical, a methylethylamino radical, A monoethylamino radical, a diethylamino radical, the monopropyl amino group, a dipropylamino radical, The methylpropyl amino group, an ethyl propylamino radical, a diisopropylamino radical, A Monod n-butylamino radical, a G n-propylamino radical, a methyl-n-butylamino radical, An ethyl-n-butylamino radical, a propyl-n-butylamino radical, an isopropyl-n-butylamino radical, The mono-isobutyl amino group, the diisobutyl amino group, the methyl isobutyl amino group, The ethyl isobutyl amino group, the propyl isobutyl amino group, the isopropyl isobutyl amino group, A mono-pentylamino radical, the dipentyl amino group, a methyl pentylamino radical, An ethyl pentylamino radical, a propyl pentylamino radical, an isopropyl pentylamino radical, n-butyl pentylamino radical, an isobutyl pentylamino radical, a mono-hexylamino radical, The dihexyl amino group, a methyl hexylamino radical, the ethylhexyl amino group, A propyl hexylamino radical, an isopropyl hexylamino radical, n-butyl hexylamino radical, isobutyl hexylamino radical, a pentyl hexylamino radical, a mono-hydroxyethylamino radical, A dihydroxy ethylamino radical, the mono-hydroxypropyl amino group, a

dihydroxy propylamino radical, A mono-hydroxy isopropylamino radical, a dihydroxy propylamino radical, A mono-hydroxy-n-butylamino radical, a dihydroxy-n-butylamino radical, The mono-hydroxy isobutyl amino group, the dihydroxy isobutyl amino group, A mono-hydroxy pentylamino radical, a dihydroxy pentylamino radical, a mono-hydroxy hexylamino radical, a dihydroxy hexylamino radical, N-methyl hydroxyethylamino radical, a morpholino radical, a piperidino radical, etc. are mentioned. [0023] Moreover, as an example of the radical in [Z] a formula, ethylenediamine residue, N, and N'-dimethyl ethylenediamine residue and N-N'-diethyl ethylenediamine residue, 1, 3-diaminopropane residue, tetramethylenediamine residue, pentamethylene diamine residue, hexamethylenediamine residue, piperazine residue, a transformer -2, 5-dimethyl piperazine residue, etc. are mentioned. [0024] (2) The following can be illustrated as a product obtained by the reaction of cyanuric acid chloride and diamines.

- i) Product obtained by the reaction in the mole ratio 1 of cyanuric acid chloride / ethylenediamine / 5 - 1/1. The product obtained by the reaction in cyanuric acid chloride / 1, and the mole ratio 1 of 3-diaminopropane / 5 - 1/1.
- ii) Product obtained by the reaction in the mole ratio (former / latter =) 1 of cyanuric acid chloride and a hexamethylenediamine / 5 - 1/1.
- iii) Product obtained by the reaction in the mole ratio (former / latter =) 1 of cyanuric acid chloride and a piperazine / 5 - 1/1.

[0025] (3) The nitrogen-containing organic compound illustrated to a degree besides an above-mentioned nitrogen-containing compound can also be used. That is, there are a resultant of a melamine, MEREMU, MERAMU, AMMERIN, a phosphoric-acid melamine, a polyphosphoric acid melamine, a cyanuric acid melamine, tris (2-hydroxyethyl) isocyanurate, an ethylene urea, and formaldehyde, a resultant of ethylenetiourea and formaldehyde, a resultant of an ethylene urea, a melamine, and formaldehyde, and a resultant of ethylenetiourea, a melamine, and formaldehyde.

[0026] Moreover, the following approaches can be mentioned if it considers as the manufacture approach of the homopolymer which makes a configuration unit the above-mentioned 2-piperazinylene-4-morpholino-1,3,5-triazine which is a kind of a nitrogen-containing organic compound. 2 [this mol], o-dihalo-4-morpholino 1,3,5-triazine (for example, 2 and o-dichloro-4-morpholino-1,3,5-triazine or 2, and 6-dibromo-4-morpholino-1,3,5-triazine and a piperazine are made to react to the bottom of existence of organic or an inorganic base (for example, triethylamine, tributylamine, a sodium hydroxide, a potassium hydroxide, or a sodium carbonate) under heating in inert solvents, such as a xylene) This resultant is filtered after reaction termination, separation extraction of the solid is carried out, and a solid is dried, after washing this solid by the boiling water and removing the salt of a by-product.

[0027] The homopolymer which makes a configuration unit the 2-piperazinylene-4-morpholino-1,3,5-triazine obtained was insoluble to the usual organic solvent, and the melting point was not observed but was a thing with a decomposition temperature [of about 304 degrees C], and a true specific gravity of 1.3g [/cc].

[0028] Moreover, also when obtaining the homopolymer which makes a configuration unit 2-piperazinylene-4-screw (hydroxyethyl) amino-1,3,5-triazine, the same approach as **** can be applied by using 2 and 6-dihalo-4-morpholino 1,3,5-triazine as a raw material.

[0029] In order to acquire the resultant of cyanuric acid chloride and ethylenediamine, water or an inactive organic solvent is made for cyanuric acid chloride and ethylenediamine to react to the bottom (for the ethylenediamine of a raw material itself to function as demineralization acid in this case) of existence of organic or an inorganic base (for example, triethylamine, tributylamine, a sodium hydroxide, a potassium hydroxide, or a sodium carbonate) or un-existing as a solvent by the mole ratio (former / latter =) 1 / 5 - 1/1. It starts from the temperature of 10 degrees C or less, and a reaction is performed by heating to the reflux temperature of a solvent gradually. After reaction termination, this resultant is filtered, a solid is separated, and the solid which remains after washing this solid by the boiling water and removing the salt of a by-product is dried. The acquired solid resultant was insoluble to the organic solvent, and the solubility of decomposition temperature to the water of a room temperature was also 324 degrees C 0.1% or less.

[0030] In order to acquire the resultant of an ethylene urea and formaldehyde, an ethylene urea and a formaldehyde water solution are taught to a reaction container so that it may become at a mole ratio 1 [about], and it heats, keeping pH of the system of reaction at 7-8 by using water as a solvent. It is made to react under heating, keeping pH at 3-4 after that, a resultant is filtered and a solid is separated, and this solid is washed several times by the boiling water, and it dries. The decomposition temperature of the acquired solid resultant was 311 degrees C.

[0031] The desirable blending ratio of coal of these nitrogen-containing organic compound is 1 - 10 % of the weight especially preferably 0.5 to 20% of the weight more preferably 0.1 to 30% of the weight.

[0032] As an example of (D) polyhydric alcohol which is one of the constituents of the fire-resistant polyolefine system resin constituent which comes to blend the flame-retarder constituent or this flame-retarder constituent in connection with this invention, the complex of pentaerythritol, dipentaerythritol, the poly pentaerythritol, neopentyl glycol, trimethylol propane, a mannitol, a sorbitol and this polyhydric alcohol and boric acid, and a metal is raised.

[0033] In order to obtain the complex of this polyhydric alcohol, boric acid, and a metal, pentaerythritol and boric acid are [aqueous] under intermediation, and heat them, add gradually and the water solution of the water-soluble salt of metals, such as aluminum, calcium, cobalt, nickel, barium, magnesium, zinc, and manganese, for example, acetate, and a carbonate is made to react under heating further after that, and a cooling happiness-in-the-next-life product is filtered, and it dries.

[0034] The desirable blending ratio of coal of these polyhydric alcohol is 1 - 5 % of the weight especially preferably 0.5 to 10% of the weight more preferably 0.1 to 20% of the weight.

[0035] The following can be illustrated as a suitable thing of the polyolefine system resin used as the base material of the fire-resistant polyolefine system resin constituent of this invention.

- (i) Polyolefin resin - It considers as ethylene homopolymer resin and an ethylene principal component, and is the copolymer resin of this ethylene and the alpha olefin more than a propylene.;
- It considers as the crystalline homopolymer resin of a propylene, and a propylene principal component, and they are this propylene, ethylene, or the crystalline copolymer resin with 1-olefin more than 1-butene.;
- Consider as the homopolymer resin of 1-butene, and 1-butene principal component, and it is the copolymer resin with 1-olefin more than this 1-butene, ethylene and a propylene, or 1-pentene.;
- Consider as the homopolymer resin of 4-methyl-1-pentene, and a 4-methyl-1-pentene principal component, and it is the copolymer resin with 1-olefin more than this 4-methyl-1-pentene, ethylene and a propylene, one butene, or 1-heptene.;
- Resin blend object which consists of two or more kinds of the above-mentioned resin;
- Modified resin which denaturalized the above-mentioned resin with an organic partial saturation acid or its derivative; the following can be illustrated as desirable resin especially.
- High density polyethylene (HDPE) and - Low density polyethylene (LDPE), - Straight chain-like low density polyethylene (LLDPE) and - Propylene homopolymer, - A propylene is used as a principal component. This propylene, ethylene, 1-butene, One or more sorts of crystalline random copolymers or crystalline block-copolymer [of 1-olefins, such as 1-pentene, 1-hexene 4-methyl-1-pentene, 1-heptene, 1-octene, or 1-decene,], two or more sorts of mixture of these crystalline polymers : [0036] (ii)

Thermoplastic-elastomer-olefin thermoplastic elastomer olefin says the polymer whose elastomer side it is the complex of polyolefine system resin and an olefin system elastomer, and is a partial bridge formation object depending on the case. As an example of the component polymer, it is :- which can mention the following combination. Polyethylene system resin (PE), ethylene-propylene system rubber (EPM, EPDM), and - A polypropylene resin (PP), ethylene-propylene system rubber (EPM, EPDM), and - A polypropylene resin (PP), ethylene-1-butene system rubber (EBM, EBDM), and - A polypropylene resin (PP), propylene-1-butene system rubber (PBM, PBDM), etc.

As a useful thing, a resinous principle can mention also in these the thermoplastics elastomer which is a polypropylene resin practical.

[0037] In order to manufacture the suitable thermoplastic elastomer which produces effectiveness practically sufficient by this invention, polyolefine system resin and an olefin system elastomer are

inserted in a thermal melting solution kneading means, for example, an extruder, or a roll mill, and if required, it will process under the condition which may produce partial bridge formation of predetermined temperature, time amount, etc. with the organic peroxide of need 10 daily dose in partial bridge formation. The obtained processing object could be freely fabricated by the fabricating method applicable to thermoplastics, and the mold goods moreover obtained are equipped to some extent with rubber elasticity.

[0038] If it is in the fire-resistant polyolefine system resin constituent of this invention, various kinds of additives usually added by polyolefine system resin, for example, an antioxidant, a heat-resistant stabilizer, an ultraviolet-rays inhibitor, an antistatic agent, copper inhibitor, lubricant, neutralizers (a higher-fatty-acid metal salt, for example, calcium stearate, zinc stearate, a metallic oxide and a metal hydroxide compound salt, for example, a hydrotalcite, or manasseite), a nucleating agent, or a pigment can be suitably used together.

[0039] The fire-resistant polyolefine system resin constituent of this invention can be manufactured as follows, for example. namely, the polyolefine system resin used as the base -- a polyphosphoric acid ammonium compound, a new phosphoric-acid amine salt or a condensed-phosphoric-acid amine salt, a nitrogen-containing compound, and/or a polyhydric-alcohol list -- the need -- responding -- other additives -- respectively -- every [the specified quantity] -- it supplies to suitable mixed equipment (trade name), for example, a Henschel mixer, a super mixer, or a tumbler mixer, and is obtained by subsequently carrying out stirring mixing for 1 - 10 minutes. The fire-resistant target constituent can also be obtained by cutting and pelletizing what extruded the obtained mixture in the shape of a strand after carrying out melting kneading using an extruder with a vent etc. if needed [, such as a roll kneading machine or a screw extruder,] at 170-260 degrees C of melting kneading temperature usual.

[0040]

[Example] This invention is not limited by this, although an example and the example of a comparison are shown below in order to explain this invention concretely. Moreover, evaluation in an example and the example of a comparison was performed by the following approach. In addition, as long as there is no notice especially, the section shown in the example of manufacture, an example, and the example of a comparison is the weight section.

[0041] (1) Fire retardancy : it is based on the perpendicular combustion test specified to the "combustion test of the plastic material for components of a device" of the UL94VUL subject 94 (Underwriter Laboratories, Incorporated). Thickness of 1.6mm (1/16 inch) of a test piece

(2) Fire retardancy : oxygen index (O. I.)

Japanese Industrial Standards JIS It is based on K7201 (the combustion test approach of the polymeric materials by the oxygen-index method).

[0042] The phosphoric-acid amine or condensed-phosphoric-acid amine salt used for operation each example of this invention was obtained by the following approach.

[0043] After the ethylenediamine 60.2 section was dropped at the example 1 [preparation of melamine salt (B1) of ethylenediamine phosphate] agitator of manufacture, the thermometer, the dephlegmator, and the reactor with an equipped with the inlet capacity of 1l. over 20 minutes, having put in 85% of the weight of the phosphoric-acid 115.3 section, and the water 120 section, and holding in temperature of 20-30 degrees C, heating stirring was carried out at 60 degrees C for 1 hour. Subsequently, the water of the 600 sections was put into the reactor, and the melamine 126.2 section was added stirring, the temperature up was carried out to 80 more degrees C, and it held at this temperature for 2 hours. After reaction termination, it cooled, the product was filtered and washed, it dried in 105-degree C oven, and the melamine salt (B1) 241.6 section of ethylenediamine phosphate was obtained.

[0044] After the ethylenediamine 30.1 section was dropped at the example 2 [preparation of melamine salt (B-2) of ethylene JIAMIMPIRO phosphate] agitator of manufacture, the thermometer, the dephlegmator, and the reactor with an equipped with the inlet capacity of 1l. over 10 minutes, having put in the pyrophosphoric-acid 89 section and the water 30 section, and holding in temperature of 20-30 degrees C, it stirred at this temperature further for 1 hour. Subsequently, the water of the 600 sections was put into the reactor, and the melamine 126.2 section was added stirring, the temperature up was

carried out to 80 more degrees C, and it held at this temperature for 2 hours. After reaction termination, it cooled, the product was filtered and washed, it dried in 105-degree C oven, and the melamine salt (B-2) 200 section of ethylene JIAMIMPIRO phosphate was obtained.

[0045] The solution which melted the piperazine 43.05 section in the water of the 100 sections was put into the example 3 [preparation of melamine salt (B3) of PIPERAJIMPIRO phosphate] agitator of manufacture, the thermometer, the dephlegmator, and the reactor with an equipped with the inlet capacity of 2l., and after the solution which diluted the pyrophosphoric-acid 89 section with the water of the 50 sections was dropped holding in temperature of 20-30 degrees C, it stirred at this temperature further for 1 hour. Subsequently, the water of the 650 sections was put into the reactor, and the melamine 126.1 section was added stirring, the temperature up was carried out to 80 more degrees C, and it held at this temperature for 2 hours. After reaction termination, it cooled, the product was filtered and rinsed, it dried in 105-degree C oven, and the melamine salt (B3) 250 section of PIPERAJIMPIRO phosphate was obtained.

[0046] The solution which melted the piperazine 21.05 section in the water of the 100 sections was put into the example 4 [preparation of melamine salt (B4) of piperazine poly phosphate] agitator of manufacture, the thermometer, the dephlegmator, and the reactor with an equipped with the inlet capacity of 2l., and after the solution which diluted the polyphosphoric acid (H₆P₄O₁₃) 84.5 section with the water of the 50 sections was dropped holding in temperature of 20-30 degrees C, it stirred at the room temperature further for 1 hour. Subsequently, the water of the 650 sections was put into the reactor, and the melamine 126.1 section was added stirring, the temperature up was carried out to 80 more degrees C, and it held at this temperature for 2 hours. After reaction termination, it cooled, the product was filtered and rinsed, it dried in 105-degree C oven, and the melamine salt (B4) 218.2 section of piperazine poly phosphate was obtained.

[0047] It is TERRAJU (TERRAJU) as example 1 ammonium polyphosphate. - The homopolymer (C1) which makes 2-piperazinylene-4-morpholino-1,3,5-triazine a monomeric unit for the melamine salt (B1) of the ethylenediamine phosphate obtained in said example 1 of manufacture considering M30 (A1) as 18 weight sections and an amine salt of a phosphoric acid as a nitrogen-containing compound 5% of the weight was inserted in the Henschel mixer (trade name), and carried out churning mixing for 3 % of the weight for 3 minutes. Subsequently, it is crystalline propylene homopolymer [MFR (the temperature of 230 degrees C) as polyolefine system resin. Load 2.16Kg/10g/10min.] (E1) 62.8 % of the weight, high-density-polyethylene [MI(temperature [of 190 degrees C], load 2.16Kg) 6.5g -- /10min.; trade name: - Chisso polyethylene M680(Chisso Corp. make)] (E3) 10% of the weight As various additives, and the hydrotalcite (F1) 0.7 weight section, 0.2 % of the weight (F2) of 2,6-di-t-butyl-p-cresol, dimyristyl - Additional insertion of 0.2 % of the weight (F3) of beta and beta'-thiodipropionate and the 0.1 % of the weight (F4) of the calcium stearates was carried out, and churning mixing was carried out for 3 more minutes. The extruder (aperture of 30mm) was used, the obtained mixture was melting-kneaded (temperature of 200 degrees C), it extruded and the pellet of a flame-retardant-resin constituent was obtained. After drying the obtained pellet at the temperature of 100 degrees C for 3 hours, each test piece predetermined with an injection molding machine (it is set as the temperature of 220 degrees C of a cylinder) was produced using this pellet, and the fire-resistant trial was performed. The result was shown in Table 1.

[0048] Based on the example 1, fire-resistant evaluation was performed using the pellet produced based on the example 1 except [which was shown in one to examples 2-9 and example of comparison 3 table 1] having changed combination like. The result is shown in Table 1. The used ammonium polyphosphate (A), the amine salt (B) of condensed phosphoric acid, a nitrogen-containing compound (C), polyhydric alcohol (D), polyolefine system resin (E), and various additives (F) used for the example 1 what is shown below in addition to the thing of a publication at that time.

Component (A2) : Ammonium polyphosphate [TERRAJU (TERRAJU)-C60 (Chisso Corp. make)],

Component (B-2) - (B4) : The amine salt of the condensed phosphoric acid prepared in said examples 2-4 of manufacture, Component (C2) : The copolymer which makes a monomeric unit 2-piperazinylene-4-morpholino-1,3,5-triazine and 2-piperazinylene-4-N and N-screw (hydroxyethyl)-1,3,5-triazine,

Component (C3) : The resultant to which cyanuric acid chloride and ethylenediamine were made to react by mole ratios (former / latter =) 1/3, Component (C4) : Tris (2-hydroxyethyl) isocyanurate, Component (C5) : A melamine, component (D1):dipentaerythritol, Component (E2) : 8.5 % of the weight of crystalline propylene-ethylene block-copolymer [ethylene quantitative formulas, MFR (temperature [of 230 degrees C], load 2.16Kgf) 20g/10min.], component (E4): -- low-density-polyethylene [MI(temperature [of 190 degrees C], load 2.16Kgf) 3g -- /10min.; trade name: -- PETOROSEN186(TOSOH CORP. make)] -- component (E5): -- ethylene-propylene rubber [trade name: -- EP- 02P(Japan Synthetic Rubber Co., Ltd. make)], component (F5):zinc stearate, component (F6):zinc borate, a component (F7):aluminum oxide, and a component (F8):titanium dioxide.

[0049]

[Effect of the Invention] (A) polyphosphoric acid ammonium compound of this invention, and (B) -- since the fire-resistant thermoplastics constituent which comes to blend a new phosphoric-acid amine salt or a condensed-phosphoric-acid amine salt with (C) thermoplastics demonstrates the fire retardancy excellent in the low addition, it can begin the field of an electric product by the ability using this constituent as fire-resistant mold goods, and it can be used for it much more suitable for fields, such as building materials and autoparts.

[0050]

[Table 1]

一、致

		PPベース				HDPEベース				LDPEベース			
		実施例1	実施例2	実施例3	実施例4	実施例5	実施例6	実施例7	実施例8	実施例9	比較例1	比較例2	比較例3
機 成	A1	18	18		18	20	20	20		5		20	20
	A2			18	18			20		15			
	B1	5				2					18		
	B2		4			2			4				4
	B3			3			4			4			
機 成	B4				3			3					
	C1	3				5					5		
	C2		4				4		4			4	
	C3			5				6		6			2
	C4				3		2						
機 成	C5				2			1					
	D1				2	2	1		1			1	
	E1	62.8			50						62.8		
	E2		57.8	52		5							
	E3	10	15	10	15	62	57	53.8			10	57	
機 成	E4								68.8	57.8			68.8
	E5			10	5		10	15		10		10	
	F1	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	F2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	F3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
機 成	F4	0.1			0.1	0.1	0.1	0.1		0.1	0.1	0.1	
	F5		0.1	0.1					0.1				0.1
	F6			0.8					1				1
	F7				0.8		0.8			1		0.8	
	F8					0.8							
タルク												4	5
UL94V		V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	該当せず	V-2	該当せず
O.I.		32.1	33.3	33.8	35.2	34.3	34.1	34.5	32.3	32.5	28.7	30.3	28.9

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

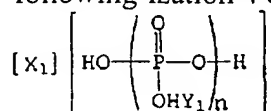
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] This invention has the following configuration.

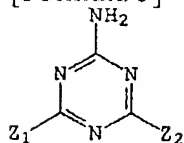
(1) The fire-resistant polyolefine system resin constituent characterized by blending the following component (A), (B), (C), and/or (D) with polyolefine system resin.

(A) A polyphosphoric acid ammonium compound, the phosphoric-acid amine salt expressed with (B) following-ization 4 or a condensed-phosphoric-acid amine salt, [Formula 4]



(n is the integer of 1-100 among a formula, X1 is the diamine containing [R1R2-N(CH2) mNR three R4], a piperazine, or a piperazine ring, R1, R2, R3, and R4 are the straight chain of H or carbon numbers 1-5, or the alkyl group of branching, respectively, and even if R1, R2, R3, and R4 are the same radicals, they may differ.) m is the integer of 1-10, and Y1 is a triazine derivative expressed with three NH(s) or the following-ization 5 in ** 4.

[Formula 5]



(a formula -- inside -- Z -- one -- and -- Z -- two -- being the same -- even when -- differing -- **** - NR -- five -- R -- six -- a set -- [-- here -- R -- five -- R -- six -- the same -- or -- having differed -- H -- or -- a carbon number -- one - six -- a straight chain -- or -- branching -- an alkyl group -- or -- the methylol -- a radical --] -- a hydroxyl group -- a sulfhydryl group -- a carbon number -- one - ten -- a straight chain -- or -- branching -- an alkyl group -- a carbon number -- one - ten -- a straight chain -- or -- branching -- an alkoxyl group -- a phenyl group -- and -- a vinyl group -- from -- becoming -- a group -- choosing -- having -- a radical -- it is .

(C) A nitrogen-containing organic compound, (D) polyhydric alcohol.

[0010] (2) The fire-resistant polyolefine system resin constituent which makes the whole constituent 100 % of the weight, and is characterized by blending the following component (A), (B), (C), and/or (D) with polyolefine system resin ten to 50% of the weight in total.

(A) 1 - 30 % of the weight of polyphosphoric acid ammonium compounds, the phosphoric-acid amine salt expressed with ** 4 given in the 1st term of (B) above or the condensed-phosphoric-acid amine salt 0.1 the 30-% of the weight and (C) nitrogen-containing compound 0.1 - 1 - 20 % of the weight of 30-% of the weight and (D) polyhydric alcohol.

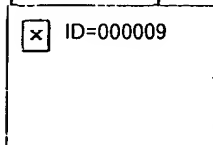
(3) Said 1st term whose oxygen index is 30 or more, or a fire-resistant polyolefine system resin constituent given in the 2nd term.

(4) The fire-resistant polyolefine system resin constituent of said 1st term which is the compound with

which a polyphosphoric acid ammonium compound uses as a principal component the ammonium polyphosphate or ammonium polyphosphate expressed with general formula $(\text{NH}_4)_r + 2\text{PrO}_3 + 1$ (however, r integer of 20-1000) - the 3rd term given in any 1 term.

(5) The fire-resistant polyolefine system resin constituent of said 1st term which is the homopolymer and/or copolymer with which a nitrogen-containing organic compound consists of a configuration unit expressed with the following-ization 6 - the 4th term given in any 1 term.

[Formula 6]



X2 and Y2 are radicals which each has combined with the triazine frame through a nitrogen atom among [type. The ARUKINO amino group as which X2 is expressed in -NHR7 or -NR eight R9, It is a morpholino radical or a piperidino radical, and each of R7, R8, and R9 is the lines or branching-like alkyl groups containing 1-6 carbon atoms (R8 and R9 may be the same or a different radical mutually). X2 is a hydroxy ARUKINO amino group expressed with -NHR10 or -NR 11R12. Each of R10, R11, and R12 is the lines or branching-like hydroxyalkyl radicals containing 2-6 carbon atoms (the same or a different radical is mutually sufficient as R11 and R12). Y2 is the divalent radical of a piperazine, and a divalent radical (it is here) expressed with formula-HN(CH2) sNH-. or s is the number of 2-6, it is a divalent radical (t is the integer of 2-4 here) expressed with -NR13(CH2) tR14N-, and either [at least] R13 or R14 are a hydroxyethyl radical --] .

[0011] (6) The fire-resistant polyolefine system resin constituent of said 1st term whose nitrogen-containing organic compound is a product obtained by the reaction of cyanuric acid chloride and diamines - the 4th term given in any 1 term.

(7) The fire-resistant polyolefine system resin constituent of said 1st term whose nitrogen-containing compound is one or more sorts chosen from the group which consists of the resultant of a melamine, MEREMU, MERAMU, AMMERIN, a phosphoric-acid melamine, a polyphosphoric acid melamine, a cyanuric acid melamine, tris (2-hydroxyethyl) isocyanurate, an ethylene urea, and formaldehyde, the resultant of ethylenetiourea and formaldehyde, a resultant of an ethylene urea, a melamine, and formaldehyde, and a resultant of ethylenetiourea, a melamine, and formaldehyde - the 4th term given in any 1 term.

[0012] (8) The fire-resistant polyolefine system resin constituent of said 1st term which is one or more sorts chosen from the group which polyhydric alcohol becomes from the metal complex of pentaerythritol, dipentaerythritol, the poly pentaerythritol, neopentyl glycol, trimethylol propane, a mannitol, sorbitols, and those boric acid - the 4th term given in any 1 term.

(9) The fire-resistant polyolefine system resin constituent given [said] in the 4th term characterized by being the compound by which covering or microencapsulation processing was carried out by one or more sorts of resin chosen from the thermosetting resin group which the compound which uses ammonium polyphosphate as a principal component becomes from a melamine monomer or melamine resin, denaturation melamine resin, guanamine resin, an epoxy resin, phenol resin, urethane resin, a urea-resin, and the poly carbodiimide on the surface of ammonium polyphosphate.

[0013] The polyphosphoric acid ammonium compound which is one of the constituents of the fire-resistant polyolefine system resin constituent in connection with this invention is a compound which uses an ammonium polyphosphate simple substance or this ammonium polyphosphate as a principal component. This ammonium polyphosphate is the compound which can express with general formula $(\text{NH}_4)_r + 2\text{PrO}_3 + 1$ (however, r integer of 20-1000), and r is the compound which can be approximated to the formula (NH_4PO_3) (r is the same as the above here) r of a metaphosphoric acid, when large enough. as the commercial item of this ammonium polyphosphate -- exoRITTO (Exolit) -422 (a trade name --) the Hoechst A.G. make and exoRITTO (Exolit) -700 (a trade name --) FOSUCHIEKU (Phos-chek)-P [the Hoechst A.G. make and]/30 (a trade name --) FOSUCHIEKU (Phos-chek)-P [the

Monsanto Co. make and J/40 (a trade name --) The Monsanto Co. make, Sumisafe - P (a trade name, Sumitomo Chemical Co., Ltd. make), TERRAJU (TERRAJU) - S10 (a trademark, Chisso Corp. make), TERRAJU (TERRAJU) - S20 (a trademark, Chisso Corp. make) can be mentioned.

[0014] Moreover, since this ammonium polyphosphate simple substance tends to receive hydrolysis, what covered this ammonium polyphosphate particle with that which covered or microencapsulated this ammonium polyphosphate with thermosetting resin, a melamine monomer, other nitrogen-containing organic compounds, etc. can use it suitably, and also in what processed with the surfactant or the silicon compound, and the process in which ammonium polyphosphate is manufactured, it adds a melamine etc. and can use what was made refractory. for example, independent [as resin to cover / in resin such as an epoxy resin, urethane resin, acrylic resin, phenol resin, an alkyd resin, a urea-resin, and melamine resin,] as an approach of obtaining the ammonium polyphosphate which microencapsulated with thermosetting resin -- or it uses together, and it can encapsulate by well-known approaches, such as interfacial polymerization, an in-situ polymerization method, the hardening-in liquid method, a phase separation method, liquid drying, a fusion distribution cooling method, a spray drying process, and a powder floor method, and can obtain. thus, as a commercial item of the compound which uses as a principal component the ammonium polyphosphate which reduced hydrolysis nature ExoRITTO -462 (a trade name, Hoechst A.G. make) (Exolit), Sumisafe-PM (a trade name, Sumitomo Chemical Co., Ltd. make) and TERRAJU (TERRAJU)-C60 (a trademark --) The Chisso Corp. make, TERRAJU (TERRAJU) - M30 (a trademark, Chisso Corp. make), TERRAJU (TERRAJU) - C70 (a trademark, Chisso Corp. make), TERRAJU (TERRAJU) - C80 (a trademark, Chisso Corp. make) etc. is mentioned.

[0015] As loadings of the polyphosphoric acid ammonium compound for obtaining the flame-retardant-resin constituent of this invention, it is 10 - 20 % of the weight especially preferably five to 25% of the weight more preferably one to 30% of the weight to a constituent.

[0016] The phosphoric-acid amine salt or condensed-phosphoric-acid amine salt in connection with this invention which is one of the constituents of a fire-resistant polyolefine system resin constituent is a new compound, for example, can be obtained by the following approach. The phosphoric acid, or the degree about two to 100 condensed phosphoric acid or condensation of the specified quantity is put into a reaction container, without adding addition or a solvent for an inactive solvent. Namely, subsequently the diamine (R1, R2, R3, and R4 are the straight chain of H or carbon numbers 1-5, or the alkyl group of branching here, respectively -- even if R1, R2, R3, and R4 are the same radicals, they may differ.) expressed with [R1R2-N(CH2) mNR three R4] Moreover, m dilutes and adds in direct or water with the dissolution or a solvent, and makes the compound (these are named generically below and it is called diamines) which is the diamine containing the piperazine or piperazine **** which is the integer of 1-10 react to it at -10-100 degrees C. A reaction is neutralization and advances promptly. Next, the new (condensation) phosphoric-acid amine salt of this invention is obtained by making it add, heat and react, without diluting the triazine derivative expressed with ammonia or the above-ization 5 with solvents, such as water, or diluting, without isolating the reactant generated here or isolating.

[0017] The amount of the diamines which participate in a reaction, ammonia, and a triazine derivative changes with the Lynn concentration of the phosphoric acid to be used or condensed phosphoric acid. namely, a mol with few amounts of the diamines to add than a number of a hydroxyl group of 1/2 contained in a phosphoric acid or condensed phosphoric acid -- a number, preferably, an equimolecular amount is mostly added with a phosphoric acid or condensed phosphoric acid, it is made to react and an intermediate product is acquired. Subsequently, it adds and the ammonia or the triazine derivative of an amount equivalent to the hydroxyl group which remains to this intermediate product is made to react.

[0018] As a concrete example of these diamines, N, N, N', N'-tetramethyl diamino methane, - dimethyl ethylenediamine, and N'N, N'-diethyl ethylenediamine, [ethylenediamine, N, and] N and N-dimethyl ethylenediamine, N, and N-diethyl ethylenediamine, N, N, N', N'- tetramethylethylenediamine, N and N, N', N'-diethyl ethylenediamine, A tetramethylenediamine, 1,2-propanediamine, 1,3-propanediamine, A tetramethylenediamine, pentamethylene diamine, a hexamethylenediamine, 1, 7-diamino heptane, 1, 8-diamino octane, 1, 9-diamino nonane, 1, 10-diamino decane, piperazine, trans-2, 5-dimethyl piperazine,

1, 4-screw (2-aminoethyl) piperazine, 1, and 4-screw (3-aminopropyl) piperazine etc. is mentioned, and a commercial item can be used altogether.

[0019] moreover, as a concrete example of this triazine derivative A melamine, acetoguanamine, benzoguanamine, acrylic guanamine, 2, 4-diamino-6-nonyl-1,3,5-triazine, 2, 4-diamino-6-hide ROKISHI-1,3,5-triazine, The 2-amino -4, 6-JIHAIDOROKISHI-1,3,5-triazine, 2, 4-diamino-6-methoxy-1,3,5-triazine, 2, 4-diamino-6-ethoxy-1,3,5-triazine, 2, 4-diamino-6-propoxy-1,3,5-triazine, 2, 4-diamino-6-isopropoxy-1,3,5-triazine, 2, 4-diamino-6-mercapto-1,3,5-triazine, the 2-amino -4, 6-dimercapto-1,3,5-triazine, etc. are mentioned, and a commercial item can be used altogether.

[0020] As loadings of the amine salt of the new phosphoric acid for obtaining the flame-retardant-resin constituent of this invention, or the amine salt of condensed phosphoric acid, it is 1 - 10 % of the weight especially preferably 0.5 to 20% of the weight more preferably 0.1 to 30% of the weight to a constituent.

[0021] When it exists in polyolefine system resin with other components in connection with this invention, while the nitrogen-containing organic compound which is one of the constituents of the fire-resistant polyolefine system resin constituent in connection with this invention generates nonflammable gas with the heat by contact of ignition, ignition, or flame etc., it is a compound which promotes generation or generation of this carbonaceous residue, and carbonaceous residue is specifically illustrated by following the (1) - (3).

[0022] It is the homopolymer and/or copolymer which make a base unit monomer structure expressed with the above-ization 6. (1) As an example of the radical of X₂ in a formula A monomethylamino radical, a dimethylamino radical, a methylethylamino radical, a methylethylamino radical, A monoethylamino radical, a diethylamino radical, the monopropyl amino group, a dipropylamino radical, The methylpropyl amino group, an ethyl propylamino radical, a diisopropylamino radical, A Monod n-butylamino radical, a G n-propylamino radical, a methyl-n-butylamino radical, An ethyl-n-butylamino radical, a propyl-n-butylamino radical, an isopropyl-n-butylamino radical, The mono-isobutyl amino group, the diisobutyl amino group, the methyl isobutyl amino group, The ethyl isobutyl amino group, the propyl isobutyl amino group, the isopropyl isobutyl amino group, A mono-pentylamino radical, the dipentyl amino group, a methyl pentylamino radical, An ethyl pentylamino radical, a propyl pentylamino radical, an isopropyl pentylamino radical, n-butyl pentylamino radical, an isobutyl pentylamino radical, a mono-hexylamino radical, The dihexyl amino group, a methyl hexylamino radical, the ethylhexyl amino group, A propyl hexylamino radical, an isopropyl hexylamino radical, n-butyl hexylamino radical, isobutyl hexylamino radical, a pentyl hexylamino radical, a mono-hydroxyethylamino radical, A dihydroxy ethylamino radical, the mono-hydroxypropyl amino group, a dihydroxy propylamino radical, A mono-hydroxy isopropylamino radical, a dihydroxy propylamino radical, A mono-hydroxy-n-butylamino radical, a dihydroxy-n-butylamino radical, The mono-hydroxy isobutyl amino group, the dihydroxy isobutyl amino group, A mono-hydroxy pentylamino radical, a dihydroxy pentylamino radical, a mono-hydroxy hexylamino radical, a dihydroxy hexylamino radical, N-methyl hydroxyethylamino radical, a morpholino radical, a piperidino radical, etc. are mentioned.

[0023] Moreover, as an example of the radical in [Z] a formula, ethylenediamine residue, N, and N'-dimethyl ethylenediamine residue and N-N'-diethyl ethylenediamine residue, 1, 3-diaminopropane residue, tetramethylenediamine residue, pentamethylene diamine residue, hexamethylenediamine residue, piperazine residue, a transformer -2, 5-dimethyl piperazine residue, etc. are mentioned.

[0024] (2) The following can be illustrated as a product obtained by the reaction of cyanuric acid chloride and diamines.

i) Product obtained by the reaction in the mole ratio 1 of cyanuric acid chloride / ethylenediamine / 5 - 1/1. The product obtained by the reaction in cyanuric acid chloride / 1, and the mole ratio 1 of 3-diaminopropane / 5 - 1/1.

ii) Product obtained by the reaction in the mole ratio (former / latter =) 1 of cyanuric acid chloride and a hexamethylenediamine / 5 - 1/1.

iii) Product obtained by the reaction in the mole ratio (former / latter =) 1 of cyanuric acid chloride and a piperazine / 5 - 1/1.

[0025] (3) The nitrogen-containing organic compound illustrated to a degree besides an above-mentioned nitrogen-containing compound can also be used. That is, there are a resultant of a melamine, MEREMU, MERAMU, AMMERIN, a phosphoric-acid melamine, a polyphosphoric acid melamine, a cyanuric acid melamine, tris (2-hydroxyethyl) isocyanurate, an ethylene urea, and formaldehyde, a resultant of ethylenetiourea and formaldehyde, a resultant of an ethylene urea, a melamine, and formaldehyde, and a resultant of ethylenetiourea, a melamine, and formaldehyde.

[0026] Moreover, the following approaches can be mentioned if it considers as the manufacture approach of the homopolymer which makes a configuration unit the above-mentioned 2-piperazinylene-4-morpholino-1,3,5-triazine which is a kind of a nitrogen-containing organic compound. 2 [this mol], 6-dihalo-4-morpholino 1,3,5-triazine (for example, 2 and 6-dichloro-4-morpholino-1,3,5-triazine or 2, and 6-dibromo-4-morpholino-1,3,5-triazine and a piperazine are made to react to the bottom of existence of organic or an inorganic base (for example, triethylamine, tributylamine, a sodium hydroxide, a potassium hydroxide, or a sodium carbonate) under heating in inert solvents, such as a xylene) This resultant is filtered after reaction termination, separation extraction of the solid is carried out, and a solid is dried, after washing this solid by the boiling water and removing the salt of a by-product.

[0027] The homopolymer which makes a configuration unit the 2-piperazinylene-4-morpholino-1,3,5-triazine obtained was insoluble to the usual organic solvent, and the melting point was not observed but was a thing with a decomposition temperature [of about 304 degrees C], and a true specific gravity of 1.3g [/cc].

[0028] Moreover, also when obtaining the homopolymer which makes a configuration unit 2-piperazinylene-4-screw (hydroxyethyl) amino-1,3,5-triazine, the same approach as **** can be applied by using 2 and 6-dihalo-4-morpholino 1,3,5-triazine as a raw material.

[0029] In order to acquire the resultant of cyanuric acid chloride and ethylenediamine, water or an inactive organic solvent is made for cyanuric acid chloride and ethylenediamine to react to the bottom (for the ethylenediamine of a raw material itself to function as demineralization acid in this case) of existence of organic or an inorganic base (for example, triethylamine, tributylamine, a sodium hydroxide, a potassium hydroxide, or a sodium carbonate) or un-existing as a solvent by the mole ratio (former / latter =) 1 / 3 - 1 / 1. It starts from the temperature of 10 degrees C or less, and a reaction is performed by heating to the reflux temperature of a solvent gradually. After reaction termination, this resultant is filtered, a solid is separated, and the solid which remains after washing this solid by the boiling water and removing the salt of a by-product is dried. The acquired solid resultant was insoluble to the organic solvent, and the solubility of decomposition temperature to the water of a room temperature was also 324 degrees C 0.1% or less.

[0030] In order to acquire the resultant of an ethylene urea and formaldehyde, an ethylene urea and a formaldehyde water solution are taught to a reaction container so that it may become at a mole ratio 1 [about], and it heats, keeping pH of the system of reaction at 7-8 by using water as a solvent. It is made to react under heating, keeping pH at 3-4 after that, a resultant is filtered and a solid is separated, and this solid is washed several times by the boiling water, and it dries. The decomposition temperature of the acquired solid resultant was 311 degrees C.

[0031] The desirable blending ratio of coal of these nitrogen-containing organic compound is 1 - 10 % of the weight especially preferably 0.5 to 20% of the weight more preferably 0.1 to 30% of the weight.

[0032] As an example of (D) polyhydric alcohol which is one of the constituents of the fire-resistant polyolefine system resin constituent which comes to blend the flame-retarder constituent or this flame-retarder constituent in connection with this invention, the complex of pentaerythritol, dipentaerythritol, the poly pentaerythritol, neopentyl glycol, trimethylol propane, a mannitol, a sorbitol and this polyhydric alcohol and boric acid, and a metal is raised.

[0033] In order to obtain the complex of this polyhydric alcohol, boric acid, and a metal, pentaerythritol and boric acid are [aqueous] under intermediation, and heat them, add gradually and the water solution of the water-soluble salt of metals, such as aluminum, calcium, cobalt, nickel, barium, magnesium, zinc, and manganese, for example, acetate, and a carbonate is made to react under heating further after that, and a cooling happiness-in-the-next-life product is filtered, and it dries.

[0034] The desirable blending ratio of coal of these polyhydric alcohol is 1 - 5 % of the weight especially preferably 0.5 to 10% of the weight more preferably 0.1 to 20% of the weight.

[0035] The following can be illustrated as a suitable thing of the polyolefine system resin used as the base material of the fire-resistant polyolefine system resin constituent of this invention.

- (i) Polyolefin resin - It considers as ethylene homopolymer resin and an ethylene principal component, and is the copolymer resin of this ethylene and the alpha olefin more than a propylene.;
 - It considers as the crystalline homopolymer resin of a propylene, and a propylene principal component, and they are this propylene, ethylene, or the crystalline copolymer resin with 1-olefin more than 1-butene.;
 - Consider as the homopolymer resin of 1-butene, and 1-butene principal component, and it is the copolymer resin with 1-olefin more than this 1-butene, ethylene and a propylene, or 1-pentene.;
 - Consider as the homopolymer resin of 4-methyl-1-pentene, and a 4-methyl-1-pentene principal component, and it is the copolymer resin with 1-olefin more than this 4-methyl-1-pentene, ethylene and a propylene, one butene, or 1-heptene.;
 - Resin blend object which consists of two or more kinds of the above-mentioned resin;
 - Modified resin which denaturalized the above-mentioned resin with an organic partial saturation acid or its derivative; the following can be illustrated as desirable resin especially.
 - High density polyethylene (HDPE) and - Low density polyethylene (LDPE), - Straight chain-like low density polyethylene (LLDPE) and - Propylene homopolymer, - A propylene is used as a principal component. This propylene, ethylene, 1-butene, One or more sorts of crystalline random copolymers or crystalline block-copolymer [of 1-olefins, such as 1-pentene, 1-hexene 4-methyl-1-pentene, 1-heptene, 1-octene, or 1-decene,];, two or more sorts of mixture of these crystalline polymers : [0036] (ii)
- Thermoplastic-elastomer-olefin thermoplastic elastomer olefin says the polymer whose elastomer side it is the complex of polyolefine system resin and an olefin system elastomer, and is a partial bridge formation object depending on the case. As an example of the component polymer, it is :- which can mention the following combination. Polyethylene system resin (PE), ethylene-propylene system rubber (EPM, EPDM), and - A polypropylene resin (PP), ethylene-propylene system rubber (EPM, EPDM), and - A polypropylene resin (PP), ethylene-1-butene system rubber (EPM, EBDM), and - A polypropylene resin (PP), propylene-1-butene system rubber (PBM, PBDM), etc.
- As a useful thing, a resinous principle can mention also in these the thermoplastics elastomer which is a polypropylene resin practical.

[0037] In order to manufacture the suitable thermoplastic elastomer which produces effectiveness practically sufficient by this invention, polyolefine system resin and an olefin system elastomer are inserted in a thermal melting solution kneading means, for example, an extruder, or a roll mill, and if required, it will process under the condition which may produce partial bridge formation of predetermined temperature, time amount, etc. with the organic peroxide of need 10 daily dose in partial bridge formation. The obtained processing object could be freely fabricated by the fabricating method applicable to thermoplastics, and the mold goods moreover obtained are equipped to some extent with rubber elasticity.

[0038] If it is in the fire-resistant polyolefine system resin constituent of this invention, various kinds of additives usually added by polyolefine system resin, for example, an antioxidant, a heat-resistant stabilizer, an ultraviolet-rays inhibitor, an antistatic agent, copper inhibitor, lubricant, neutralizers (a higher-fatty-acid metal salt, for example, calcium stearate, zinc stearate, a metallic oxide and a metal hydroxide compound salt, for example, a hydrotalcite, or manasseite), a nucleating agent, or a pigment can be suitably used together.

[0039] The fire-resistant polyolefine system resin constituent of this invention can be manufactured as follows, for example. namely, the polyolefine system resin used as the base -- a polyphosphoric acid ammonium compound, a new phosphoric-acid amine salt or a condensed-phosphoric-acid amine salt, a nitrogen-containing compound, and/or a polyhydric-alcohol list -- the need -- responding -- other additives -- respectively -- every [the specified quantity] -- it supplies to suitable mixed equipment (trade name), for example, a Henschel mixer, a super mixer, or a tumbler mixer, and is obtained by

subsequently carrying out stirring mixing for 1 - 10 minutes. The fire-resistant target constituent can also be obtained by cutting and pelletizing what extruded the obtained mixture in the shape of a strand after carrying out melting kneading using an extruder with a vent etc. if needed [, such as a roll kneading machine or a screw extruder,] at 170-260 degrees C of melting kneading temperature usual.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

EXAMPLE

[Example] This invention is not limited by this, although an example and the example of a comparison are shown below in order to explain this invention concretely. Moreover, evaluation in an example and the example of a comparison was performed by the following approach. In addition, as long as there is no notice especially, the section shown in the example of manufacture, an example, and the example of a comparison is the weight section.

[0041] (1) Fire retardancy : it is based on the perpendicular combustion test specified to the "combustion test of the plastic material for components of a device" of the UL94VUL subject 94 (Underwriter Laboratories, Incorporated). Thickness of 1.6mm (1/16 inch) of a test piece

(2) Fire retardancy : oxygen index (O. I.)

Japanese Industrial Standards JIS It is based on K7201 (the combustion test approach of the polymeric materials by the oxygen-index method).

[0042] The phosphoric-acid amine or condensed-phosphoric-acid amine salt used for operation each example of this invention was obtained by the following approach.

[0043] After the ethylenediamine 60.2 section was dropped at the example 1 [preparation of melamine salt (B1) of ethylenediamine phosphate] agitator of manufacture, the thermometer, the dephlegmator, and the reactor with an equipped with the inlet capacity of 1l. over 20 minutes, having put in 85% of the weight of the phosphoric-acid 115.3 section, and the water 120 section, and holding in temperature of 20-30 degrees C, heating stirring was carried out at 60 degrees C for 1 hour. Subsequently, the water of the 600 sections was put into the reactor, and the melamine 126.2 section was added stirring, the temperature up was carried out to 80 more degrees C, and it held at this temperature for 2 hours. After reaction termination, it cooled, the product was filtered and washed, it dried in 105-degree C oven, and the melamine salt (B1) 241.6 section of ethylenediamine phosphate was obtained.

[0044] After the ethylenediamine 30.1 section was dropped at the example 2 [preparation of melamine salt (B-2) of ethylene JIAMIMPIRO phosphate] agitator of manufacture, the thermometer, the dephlegmator, and the reactor with an equipped with the inlet capacity of 1l. over 10 minutes, having put in the pyrophosphoric-acid 89 section and the water 30 section, and holding in temperature of 20-30 degrees C, it stirred at this temperature further for 1 hour. Subsequently, the water of the 600 sections was put into the reactor, and the melamine 126.2 section was added stirring, the temperature up was carried out to 80 more degrees C, and it held at this temperature for 2 hours. After reaction termination, it cooled, the product was filtered and washed, it dried in 105-degree C oven, and the melamine salt (B-2) 200 section of ethylene JIAMIMPIRO phosphate was obtained.

[0045] The solution which melted the piperazine 43.05 section in the water of the 100 sections was put into the example 3 [preparation of melamine salt (B3) of PIPERAJIMPIRO phosphate] agitator of manufacture, the thermometer, the dephlegmator, and the reactor with an equipped with the inlet capacity of 2l., and after the solution which diluted the pyrophosphoric-acid 89 section with the water of the 50 sections was dropped holding in temperature of 20-30 degrees C, it stirred at this temperature further for 1 hour. Subsequently, the water of the 650 sections was put into the reactor, and the melamine 126.1 section was added stirring, the temperature up was carried out to 80 more degrees C,

and it held at this temperature for 2 hours. After reaction termination, it cooled, the product was filtered and rinsed, it dried in 105-degree C oven, and the melamine salt (B3) 250 section of PIPERAJIMPIRO phosphate was obtained.

[0046] The solution which melted the piperazine 21.05 section in the water of the 100 sections was put into the example 4 [preparation of melamine salt (B4) of piperazine poly phosphate] agitator of manufacture, the thermometer, the dephlegmator, and the reactor with an equipped with the inlet capacity of 2l., and after the solution which diluted the polyphosphoric acid (H6P4O13) 84.5 section with the water of the 50 sections was dropped holding in temperature of 20-30 degrees C, it stirred at the room temperature further for 1 hour. Subsequently, the water of the 650 sections was put into the reactor, and the melamine 126.1 section was added stirring, the temperature up was carried out to 80 more degrees C, and it held at this temperature for 2 hours. After reaction termination, it cooled, the product was filtered and rinsed, it dried in 105-degree C oven, and the melamine salt (B4) 218.2 section of piperazine poly phosphate was obtained.

[0047] It is TERRAJU (TERRAJU) as example 1 ammonium polyphosphate. - The homopolymer (C1) which makes 2-piperazinylene-4-morpholino-1,3,5-triazine a monomeric unit for the melamine salt (B1) of the ethylenediamine phosphate obtained in said example 1 of manufacture considering M30 (A1) as 18 weight sections and an amine salt of a phosphoric acid as a nitrogen-containing compound 5% of the weight was inserted in the Henschel mixer (trade name), and carried out churning mixing for 3 % of the weight for 3 minutes. Subsequently, it is crystalline propylene homopolymer [MFR (the temperature of 230 degrees C) as polyolefine system resin. Load 2.16Kgf/10g/10min.] (E1) 62.8 % of the weight, high-density-polyethylene [MI(temperature [of 190 degrees C], load 2.16Kgf) 6.5g -- /10min.; trade name: - Chisso polyethylene M680(Chisso Corp. make)] (E3) 10% of the weight As various additives, and the hydrotalcite (F1) 0.7 weight section, 0.2 % of the weight (F2) of 2,6-di-t-butyl-p-cresol, dimyristyl - Additional insertion of 0.2 % of the weight (F3) of beta and beta'-thiodipropionate and the 0.1 % of the weight (F4) of the calcium stearates was carried out, and churning mixing was carried out for 3 more minutes. The extruder (aperture of 30mm) was used, the obtained mixture was melting-kneaded (temperature of 200 degrees C), it extruded and the pellet of a flame-retardant-resin constituent was obtained. After drying the obtained pellet at the temperature of 100 degrees C for 3 hours, each test piece predetermined with an injection molding machine (it is set as the temperature of 220 degrees C of a cylinder) was produced using this pellet, and the fire-resistant trial was performed. The result was shown in Table 1.

[0048] Based on the example 1, fire-resistant evaluation was performed using the pellet produced based on the example 1 except [which was shown in one to examples 2-9 and example of comparison 3 table 1] having changed combination like. The result is shown in Table 1. The used ammonium polyphosphate (A), the amine salt (B) of condensed phosphoric acid, a nitrogen-containing compound (C), polyhydric alcohol (D), polyolefine system resin (E), and various additives (F) used for the example 1 what is shown below in addition to the thing of a publication at that time.

Component (A2) : Ammonium polyphosphate [TERRAJU (TERRAJU)-C60 (Chisso Corp. make)],
 Component (B-2) - (B4) : The amine salt of the condensed phosphoric acid prepared in said examples 2-4 of manufacture, Component (C2) : The copolymer which makes a monomeric unit 2-piperazinylene-4-morpholino-1,3,5-triazine and 2-piperazinylene-4-N and N-screw (hydroxyethyl)-1,3,5-triazine,
 Component (C3) : The resultant to which cyanuric acid chloride and ethylenediamine were made to react by mole ratios (former / latter =) 1/3, Component (C4) : Tris (2-hydroxyethyl) isocyanurate,
 Component (C5) : A melamine, component (D1):dipentaerythritol, Component (E2) : 8.5 % of the weight of crystalline propylene-ethylene block-copolymer [ethylene quantitative formulas, MFR (temperature [of 230 degrees C], load 2.16Kgf) 20g/10min.], component (E4): -- low-density-polyethylene [MI(temperature [of 190 degrees C], load 2.16Kgf) 3g -- /10min.; trade name: -- PETOROSEN186(TOSOH CORP. make)] -- component (E5): -- ethylene-propylene rubber [trade name: -- EP- 02P(Japan Synthetic Rubber Co., Ltd. make)], component (F5):zinc stearate, component (F6):zinc borate, a component (F7):aluminum oxide, and a component (F8):titanium dioxide.